

## The clinimetric properties of the de Morton Mobility Index (DEMMI) in healthy community dwelling older adults



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Sarah Davenport  
Grade 1 Physiotherapist  
Northern Health  
Email: sarah.davenport@nh.org.au

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## Why is mobility important?

- ▶ Healthcare system under pressure due to ageing population  
(Levine, 1999)
- ▶ Mobility dysfunction:
  - ▶ increased risk of falls
  - ▶ hospital readmissions
  - ▶ higher healthcare costs
  - ▶ increased nursing home admissions
  - ▶ Death



(Chuang et al., 2003; Covinsky, Justice, Rosenthal, Palmer, & Landefeld, 1997; Holahan, 1989; Lipsitz, 1991).

## Research evidence

- ▶ Two systematic reviews:
  - Acute hospital setting
    - de Morton, Davidson and Keating (2008)
  - Community setting
    - Davenport, Paynter and de Morton (2008)
- ▶ Existing instruments are inadequate for accurately assessing older adults across spectrum of abilities

## Systematic review (Davenport, 2008)



- ▶ Supports the need for development of a new mobility outcome measure
- ▶ Current mobility instruments have limitations in community dwellers

## The DEMMI (de Morton Mobility Index)

(de Morton, Davidson, & Keating, 2008)

- ▶ Provides clinicians / researchers with accurate method for assessing the mobility of older people
- ▶ Administered by observation of physical performance
- ▶ Developed in an older acute medical population using Rasch analysis
- ▶ Measures mobility across the whole spectrum
  - Bed bound to high level ambulatory tasks

### de Morton Mobility Index (DEMMI)

	0	1	2
<b>Bed</b>			
1. Edge	<input type="checkbox"/> unable	<input type="checkbox"/> able	
2. Roll onto side	<input type="checkbox"/> unable	<input type="checkbox"/> able	
3. Lying to sitting	<input type="checkbox"/> unable	<input type="checkbox"/> min assist <input type="checkbox"/> supervision	<input type="checkbox"/> independent
<b>Chair</b>			
4. Sit unsupported in chair	<input type="checkbox"/> unable	<input type="checkbox"/> 10 sec	<input type="checkbox"/> independent
5. Sit to stand from chair	<input type="checkbox"/> unable	<input type="checkbox"/> min assist <input type="checkbox"/> supervision	<input type="checkbox"/> able
6. Sit to stand without using arms	<input type="checkbox"/> unable	<input type="checkbox"/> able	
<b>Static balance (no gait aid)</b>			
7. Stand unsupported	<input type="checkbox"/> unable	<input type="checkbox"/> 10 sec	
8. Stand feet together	<input type="checkbox"/> unable	<input type="checkbox"/> 10 sec	
9. Stand on toes	<input type="checkbox"/> unable	<input type="checkbox"/> 10 sec	
10. Tandem stand with eyes closed	<input type="checkbox"/> unable	<input type="checkbox"/> 10 sec	
<b>Walking</b>			
11. Walking distance +/- gait aid	<input type="checkbox"/> unable	<input type="checkbox"/> 10m	<input type="checkbox"/> 50m
Gait aid (cane/walker/frame/walker)	<input type="checkbox"/> 5m	<input type="checkbox"/> 20m	
12. Walking independence	<input type="checkbox"/> unable	<input type="checkbox"/> independent with gait aid	<input type="checkbox"/> independent without gait aid
	<input type="checkbox"/> supervision		
<b>Dynamic balance (no gait aid)</b>			
13. Pick up pen from floor	<input type="checkbox"/> unable	<input type="checkbox"/> able	
14. Walks 4 steps backwards	<input type="checkbox"/> unable	<input type="checkbox"/> able	
15. Jump	<input type="checkbox"/> unable	<input type="checkbox"/> able	
<b>COLUMN TOTAL SCORE:</b>			
<b>RAW SCORE TOTAL</b> (sum of column total scores)			/19
<b>DEMMI SCORE</b> (MDC <sub>95</sub> = 9 points; MCID = 10 points)			/100

pick up pen from floor

walks backwards

walking distance

sit to stand no arms

walking independence

jump

stand on toes

tandem stand eyes closed

handrest

exist

sit unsupported

bridge

stand unsupported

sit to stand

roll


lie to sit

standing feet together

Raw Score	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
DEMMI score	0	8	15	20	24	27	30	33	36	39	41	44	48	53	57	62	67	74	85	100

## Why in community dwelling population?


- ▶ Reliability and validity well established in an acute medical population
- ▶ Clinimetric properties are population specific
- ▶ Now requires validation amongst a healthy community dwelling population
  - Track recovery from illness to full health
  - Monitor the mobility of healthy community dwelling older adults



## Aim

- To examine the clinimetric properties of the DEMMI amongst healthy community dwelling older adults

- Reliability
- Validity
- Minimal Clinically Important Difference (MCID)
- Floor and ceiling effects



## Location

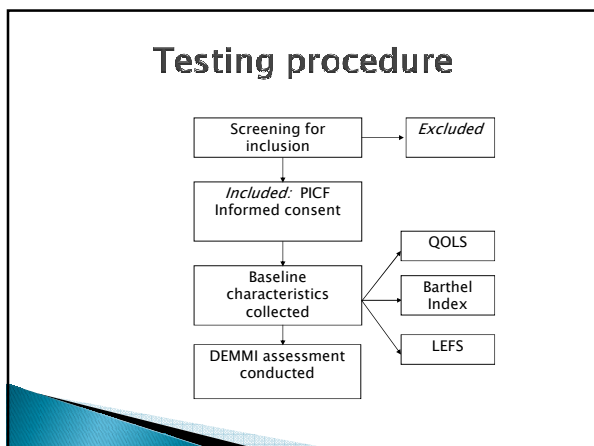
1. Federation Residential Village  
28<sup>th</sup> November, 2007
2. Noble Park RSL club  
1<sup>st</sup> September, 2009

## Methods: participants

Inclusion Criteria	Exclusion Criteria
≥65 years	Suffering any cognitive deficits
Healthy	Non English speaking
Living within community	Suffering from a disease/impairment/ balance-limiting pathology/ recent orthopaedic disorder

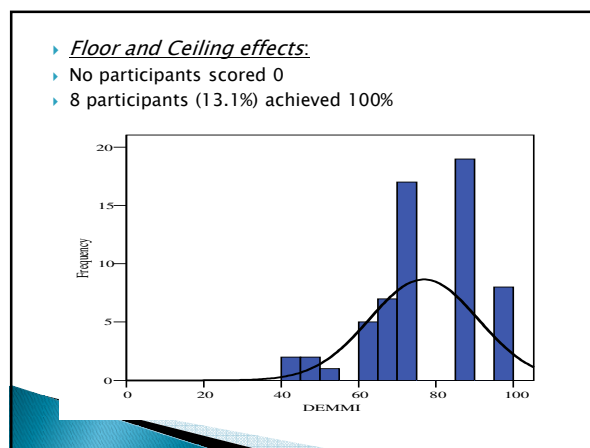
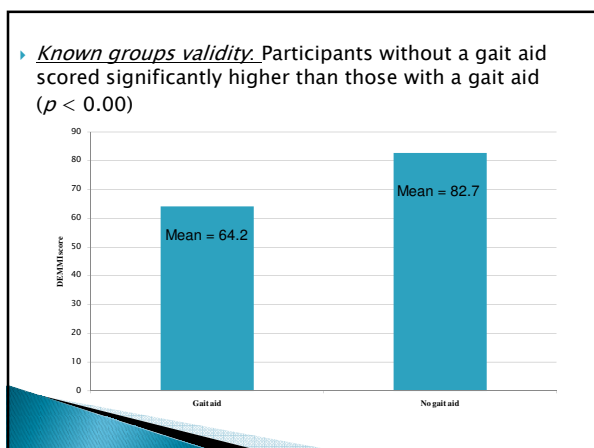
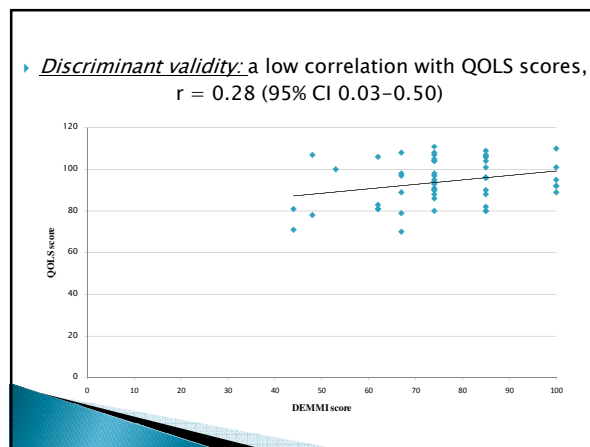
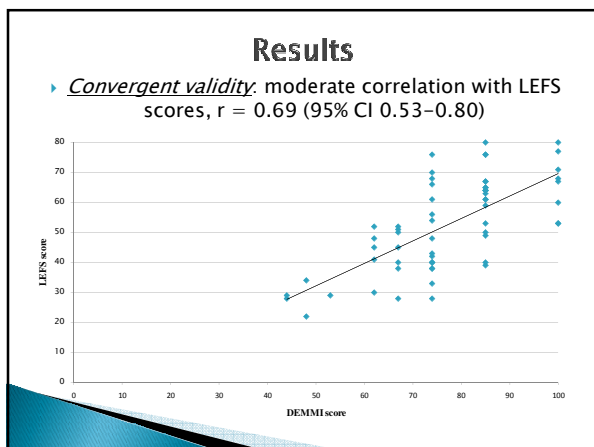
## Assessors

- ▶ Physiotherapy Honours students
- ▶ Physiotherapists



### Results

- ▶ 3 potential participants excluded:
  - Severe aortic stenosis
  - <65 years
  - No consent provided
- ▶ n = 61



## Reliability study design

- ▶ *Inter-rater reliability study (n = 29)*
- ▶ Those fatigued after initial assessment excluded
- ▶ Consecutive eligible participants invited to participate
- ▶ 2 assessors: DEMMI test developer and honours student
- ▶ Half seen first by test developer, half by honours student
- ▶ Assessments were immediately following each other where possible

## Results

- ▶ *Independent reliability:*
- ▶ MDC<sub>90</sub> = 13 points (95% CI 9 - 17)
- ▶ Subjects must change 13 points or more to be 90% confident measurement error has been overcome
- ▶ *MCID:*
  - = 7.0 points

## Discussion

- ▶ Overcomes limitations of current mobility instruments
  - Measures across whole mobility spectrum
  - Sound clinimetric properties in healthy community dwellers & acute medical population
- ▶ Similar error estimates in acute medical population
- ▶ Assessors likely to provide the most conservative error estimate
- ▶ Potential use across healthcare settings and professionals

## Limitations

- ▶ Did not measure administration time

## Future directions

- ▶ Further validation studies amongst other populations and settings are currently underway

## ? Questions ?

- ▶ Email: sarah.davenport@nh.org.au



## References

- ▶ Chuang, K. H., Covinsky, K. E., Sands, L. P., Fortinsky, R. H., Palmer, R. M., & Landefeld, C. S. (2003). Diagnosis-related group-adjusted hospital costs are higher in older medical patients with lower functional status. *Journal of the American Geriatric Society*, 51(12), 1729-1734.
- ▶ Covinsky, K. E., Justice, A. C., Rosenthal, G. E., Palmer, R. M., & Landefeld, C. S. (1997). Measuring prognosis and case mix in hospitalized elders. The importance of functional status. *Journal of General Internal Medicine*, 12(4), 203-208.
- ▶ Davenport, S. J., Paynter, S., & de Morton, N. A. (2008). What instruments have been used to assess the mobility of community dwelling older adults? [Review]. *Physical Therapy Reviews*, 13(5), 345-354.
- ▶ de Morton, N. A., Davidson, M., & Keating, J. (2008). The de Morton Mobility Index (DEMMI): an essential health index for an ageing world. *BMC Health and Quality of Life Outcomes*, 6(63).
- ▶ Holahan, J., Dubay, L.C., Kenney, G., Welch, W.P., Bishop, C. & Dor, A. (1989). Should Medicare compensate hospitals for administratively necessary days? *Milbank Quarterly*, 67(1), 137-167.
- ▶ Levine, C. (1999). The loneliness of the long-term care giver. *New England Journal of Medicine*, 340(20), 1587-1590.
- ▶ Lipsitz, L. A., Jonsson, P.V., Kelley, M.M. & Koestner, J.S. (1991). Causes and correlates of recurrent falls in ambulatory frail elderly. *Journal of Gerontology*, 46(4), M114-M122.